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Quebec Region

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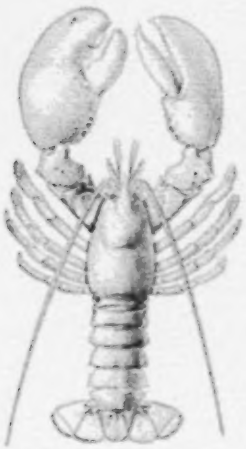
Science Advisory Report 2016/044

2015 LOBSTER STOCK ASSESSMENT ON THE NORTH SHORE (LFAS 15, 16 AND 18) AND AT ANTICOSTI ISLAND (LFA 17), QUEBEC AREA



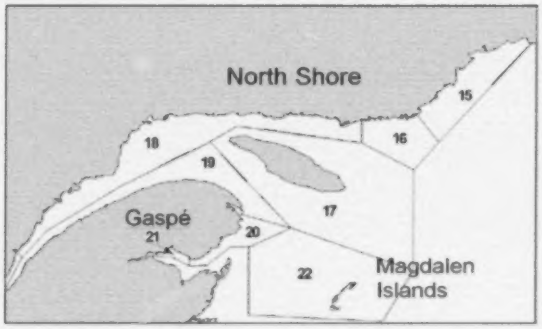


Figure 1. Map showing lobster fishing areas (LFAs) in Quebec (LFAs 15 to 18: North Shore and Anticosti, LFAs 19 to 21: Gaspé Peninsula and LFA 22: Magdalen Islands).

Context:

The lobster fishery along Quebec's North Shore is operated by some 50 fishers in 3 lobster fishing areas (LFA 15, 16 and 18) (Figure 1). Most fishers on the North Shore (around 40) are in LFA 15, there are 4 to 5 fishers depending on the year in LFA 16, and 3 to 5 fishers in LFA 18, in sub-areas C, D, G, and H (Figure 2). The lobster fishery at Anticosti Island is practised by 13 fishermen from the Middle North Shore, Gaspé Peninsula and Magdalen Islands. They are spread out primarily around the Island's easternmost tip in sub-area 17B (Figure 3). The lobster harvested off Anticosti Island is landed at the fishers' home ports.

The lobster fishery is managed by controlling the fishing effort (number of licences, number and size of traps and fishing season) and by escapement measures: release of berried females and minimum legal size (MLS). The management and conservation measures introduced over the past 19 years follow the recommendations of the Fisheries Resource Conservation Council (FRCC). The resource status is assessed every three years. This report describes the situation in 2015 and the changes observed since the last stock status assessment in 2012.

SUMMARY

- On the North Shore and at Anticosti Island, abundance and biomass indicators have increased significantly since 2011. Lobster **landings** in Area 15 were 32 t in 2015, which represents an increase of 113% compared to 2011 (15 t) and 45% compared to the average of the past 25 years (22 t). In Area 16, landings have increased by 267% (22 t) compared to 2011 (6 t) and 100% compared to the average of the past 25 years (11 t). At Anticosti Island, in Area 17B, landings have been increasing since 2005, reaching a historical

maximum of 504 t in 2015, which is a 189% increase from 2011 (174 t) and 217% of the average of the past 25 years (159 t). In Area 18, landings increased from 2 t in 2011 to 17 t in 2015.

- In areas 15 and 16, catch per unit effort (CPUE) in weight from commercial sampling increased by 151% from 2011 to 2015, while fishing effort has remained low and stable since 2011. In Area 17, the 2015 CPUE from logbooks was 131% more than 2011 levels (1.1 kg/trap), while fishing effort has been relatively stable since 2009–2011.
- Commercial sampling for demographic indicators is very limited in this region, especially in areas 15 and 16, where the number of lobster measured from commercial sampling is insufficient to draw conclusions on trends in legal lobster size or egg production. In Area 17, size structures are broad and the average size is stable. For females in this area, the average size is stable and the growing number of jumbo females (>127 mm) suggests sustained or increased egg production.
- Landings in areas 15–18 and significantly greater CPUE in areas 15–17 suggest that lobster stocks on the North Shore and at Anticosti Island are in excellent condition and that these indicators should continue to increase.
- Due to the significant increase in landings in areas 15–18, it is recommended that dockside commercial sampling be increased in these areas. It is also recommended that Area 17 catches landed in the Magdalen Islands be sampled.

INTRODUCTION

Biology

American lobster (*Homarus americanus*) occurs along the west coast of the Atlantic Ocean, from Labrador to Cape Hatteras. Adult lobsters prefer rocky substrates where they can find shelter, but can also live on sandy and even muddy bottoms. Commercial concentrations are generally found at depths of less than 35 m. On the North Shore and Anticosti Island, females would reach sexual maturity at sizes above 90 mm CL. Elsewhere in Quebec, in areas further south, females reach sexual maturity sooner (79–84 mm). Males reach sexual maturity at a smaller size than females in the same area. Females generally have a two-year reproductive cycle, spawning one year and moulting the next. Females spawning for the first time can produce nearly 8 000 eggs while large females measuring 127 mm CL (jumbo size) can lay up to 35 000 eggs. In addition to being more fertile, certain large females may spawn for two consecutive years before moulting. Once released, the eggs remain attached to the females' swimmerets for 9 to 12 months, until the planktonic larvae emerge the following summer. Spawning and hatching can occur earlier in the season for multiparous females (females spawning for the second time at least) than for primiparous females. It has also been observed that larvae can be larger upon emergence for multiparous females than for primiparous females. The larvae's planktonic phase lasts from 3 to 10 weeks, depending on the temperature of the water. Following metamorphosis, postlarval lobsters (stage IV), which now resemble adult lobsters, drift down from the surface layer to settle on the sea floor. The survival of lobster from their larval stage to their initial benthic stages is impacted by predation as well as by hydrodynamic factors that cause advection or retain the larvae near the areas that are favourable for benthic settlement. During the first few years of benthic life, until they reach approximately 40 mm, lobsters lead a cryptic existence; i.e. they live hidden in habitat providing many shelters. In areas further south, especially in the Magdalen Islands, lobsters are estimated to reach the MLS (83 mm) at around eight or nine years of age after having moulted

approximately 16 times since their benthic settlement. Recruitment to the fishery could be delayed in more northern areas because of slower growth (smaller moult increment and lower moulting frequency).

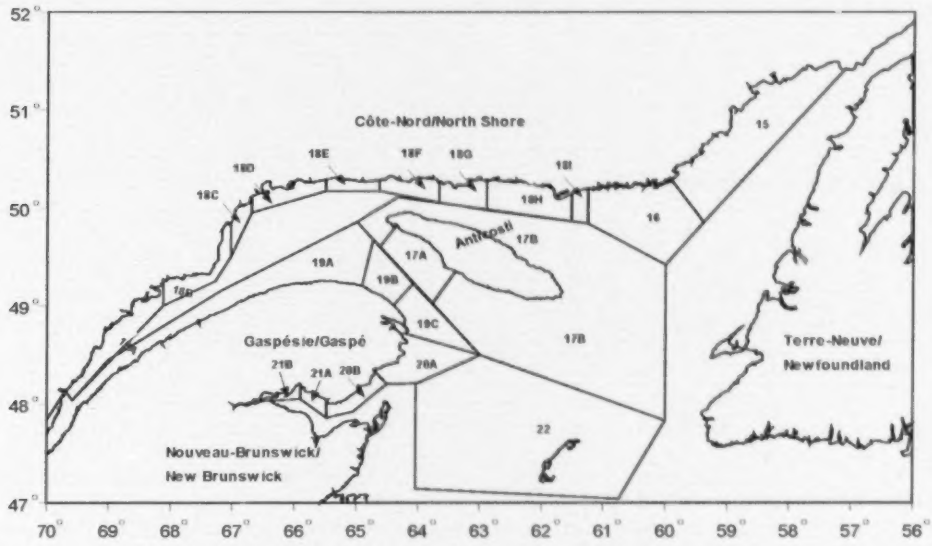


Figure 2. Lobster fishing areas (LFAs) on the Lower North Shore (LFAs 15 and 16), Upper and Middle North Shore (LFA 18, A to I) and at Anticosti Island (LFAs 17A and 17B).

Description of the Fishery

The lobster fishery is managed by controlling fishing effort by restricting the number of licences, the number and size of traps, and the duration of the fishing season. In 2015, there were 36, 5, 13 and 5 active fishers in LFAs 15, 16, 17B and 18, respectively. One licence was also issued in LFA 17A. The number of traps is limited to 250 on the North Shore and 300 at Anticosti Island. Fishers may use traps that are larger than the standard size. However, the number of traps of larger size is limited to 175 (North Shore) or 210 (Anticosti). The presence of escape vents on traps has been mandatory since 1994 and the size of their vertical opening was increased from 43 mm to 46 mm in 2005 (LFAs 15 and 16), and to 47 mm in 2003 (LFA 17) and 2004 (LFA 18). The lobster fishery is a spring fishery lasting 11 (LFAs 17 and 18) or 12 weeks (LFAs 15 and 16). In addition to having a minimum landing size (MLS), berried females must be released. The MLS was increased in 1998 to double egg production per recruit. It has been at 82 mm since 2005 in LFAs 15 and 16, and at 83 mm since 2003 in LFAs 17 and 18. It was at 76 mm from 1957 to 1997.

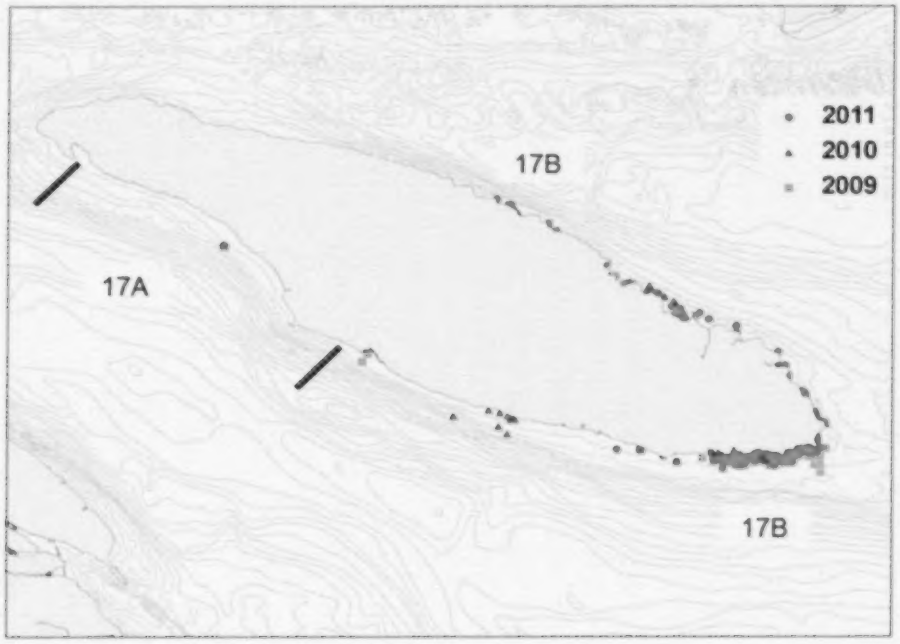


Figure 3. Fishing effort distribution in LFA 17 between 2009 and 2011.

STOCK STATUS ASSESSMENT

Source of Data

The stock status assessment is conducted for stocks in LFAs 15, 16 and 17B only. Due to lack of data, the stock status in LFA 18 cannot be assessed. The assessment is based on abundance and demographic indicators. Given that there is no more at-sea sampling (since 2004) or fishery-independent surveys for these stocks, fishing pressure and productivity are not evaluated (spawning and recruitment) as in Quebec LFAs 19–22. Abundance indicators include the landings recorded on processing plant purchase slips and catch rates of commercial-size lobsters obtained from at-sea (1993–2004) and dockside (2005–2011) sampling and from logbooks filled out daily by fishermen on an initially voluntary basis, which became mandatory in 2004 in LFA 17B and 2007 in LFAs 15 and 16. Demographic indicators were taken from size structure analysis of lobsters and include mean size, jumbo abundance (≥ 127 mm) and sex-ratio. For LFAs 15 and 16, these indicators are compiled from at-sea (1993-2004) and dockside (since 2005) sampling data. Sampling is conducted in the La Tabatière and Tête-à-la-Baleine (LFA 15) and La Romaine (LFA 16) sectors. For LFA 17B, sampling has been conducted dockside since 1998 at North Shore and Gaspé Peninsula ports of landing. For each indicator, data from the four previous years are examined and the 2015 data compared to averages from the existing data series prior to that year.

Abundance Indicators

Landings

Lobster landings in LFA 15 were 32 t in 2015, which represents an increase of 113% compared to 2011 and 45% compared to the 22-tonne average of the past 25 years (Figure 4A). In LFA 16, landings in 2015 reached 22 t, an increase of 267% compared to 2011 (6 t) and 100% compared to the average of the past 25 years (11 t) (Figure 4B). Landings from the North Shore (LFA 15, 16 and 18) account for 1% of Quebec landings (LFA 15–22). However, information on landings may not be complete. The fishing effort deployed in these areas is fairly low. The average number of traps hauled per fisher is under the authorized effort. Soak times are usually 2 or more days. Data for LFA 18 are incomplete. Annual landings were around 1 t from 2001 to 2011 but reached 17 t in 2015 (Figure 4D).

At Anticosti Island, in Area 17B, landings have been increasing since 2011, reaching a maximum of 504 t in 2015 (Figure 4C), which is a 189% increase from 2011 (174 t) and 217% of the average of the past 25 years (174 t). Landings from LFA 17B account for 9% of Quebec landings. Most traps (75%) are hauled on a daily basis. However, in 2014 and 2015, daily trap haul increased respectively to 84% and 80% due to milder weather conditions during the fishing season.

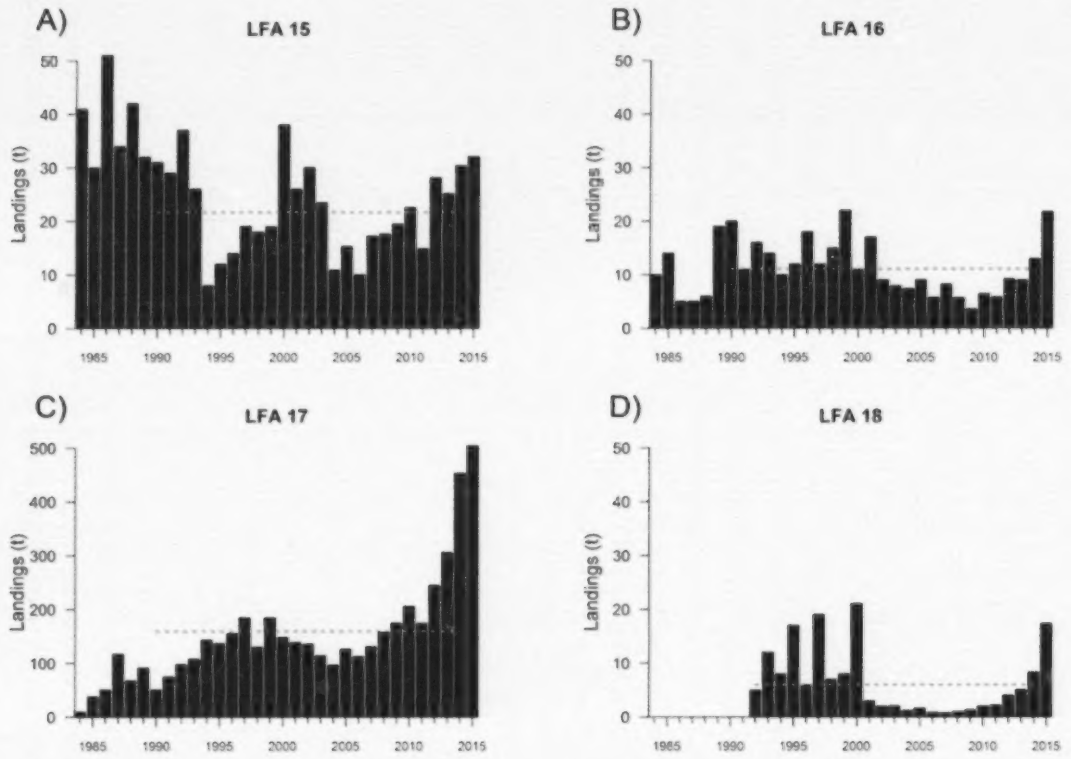


Figure 4. Lobster landings on the North Shore (LFAs 15, 16 and 18) and at Anticosti Island (LFA 17B) from 1984 to 2015. The dotted lines represent the average value for the past 25 (A, B and C) and 23 (D) years, excluding 2015.

Catch Rates for Commercial Lobster

Catch rates correspond to the catch per unit effort (CPUE) expressed in number or weight of lobster per trap (Figure 5). In 2015, CPUEs from logbooks in LFAs 15 and 16 combined were 0.52 kg of lobster per trap (kg/trap) (Figure 5B). This is an increase of 151% from 2011 (0.21 kg/trap) and 136% compared to the average of the past 22 years (0.22 kg/trap). Since 2011, numerical estimates are no longer available due to insufficient data.

In LFA 17B, CPUEs reached 2.57 kg/trap in 2015, their highest value since 2006. The 2015 CPUE was 131% more than the 2011 CPUE (1.11 kg/trap; Figure 5C).

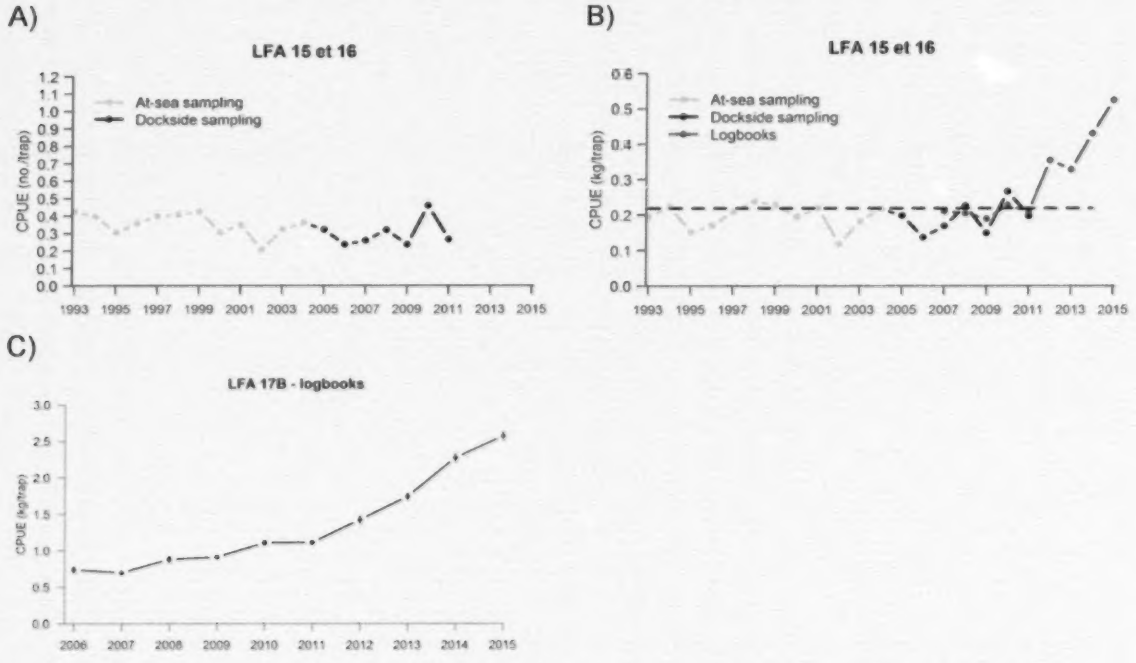


Figure 5. Catch rates (CPUE) of commercial-size lobster in LFAs 15 and 16 on the North Shore from 1993 to 2015 in number (A) and in weight (kg) (B) per trap and for LFA 17B in weight (kg) per trap (C). For A) and B): at-sea and dockside sampling data (grey and black lines), average of the past 22 years excluding 2015 (dotted line); for B): logbcok data (blue line); for C): logbook data from 2006 to 2015, average ± 95% confidence interval.

Demographic Indicators

The size structures of commercial-size lobsters in LFAs 15 and 16 show at least three modes (Figure 6A), suggesting a lower exploitation rate than what is observed in the Gaspé Peninsula for example. In recent years, the average size has remained around 97–98 mm CL (except for 2013). It is important to note that prior to the increase of the MLS, average size was around 83–84 mm. Jumbo lobsters would previously show up in samples (1–2%), but in 2014 and 2015, they were 3.2% and 3.6%, respectively. In general, it is difficult to interpret with confidence the demographic indicators from LFAs 15 and 16 due to the low number of lobsters measured in recent years. It is uncertain whether samples collected, especially those in 2013, are representative of the population.

In LFA 17B, size structures have always been characterized by the presence of several modes (Figure 6B). The mean size for all commercial lobster increased by 1.9 mm since 2011, from 93.6 mm to 95.5 mm in 2015. The increase in the mean size and the less truncated appearance of size frequencies can be partly explained by the full recruitment of strong cohorts, which is consistent with the recent increase in CPUE. The sex-ratio is above one, which seems suitable for mating.

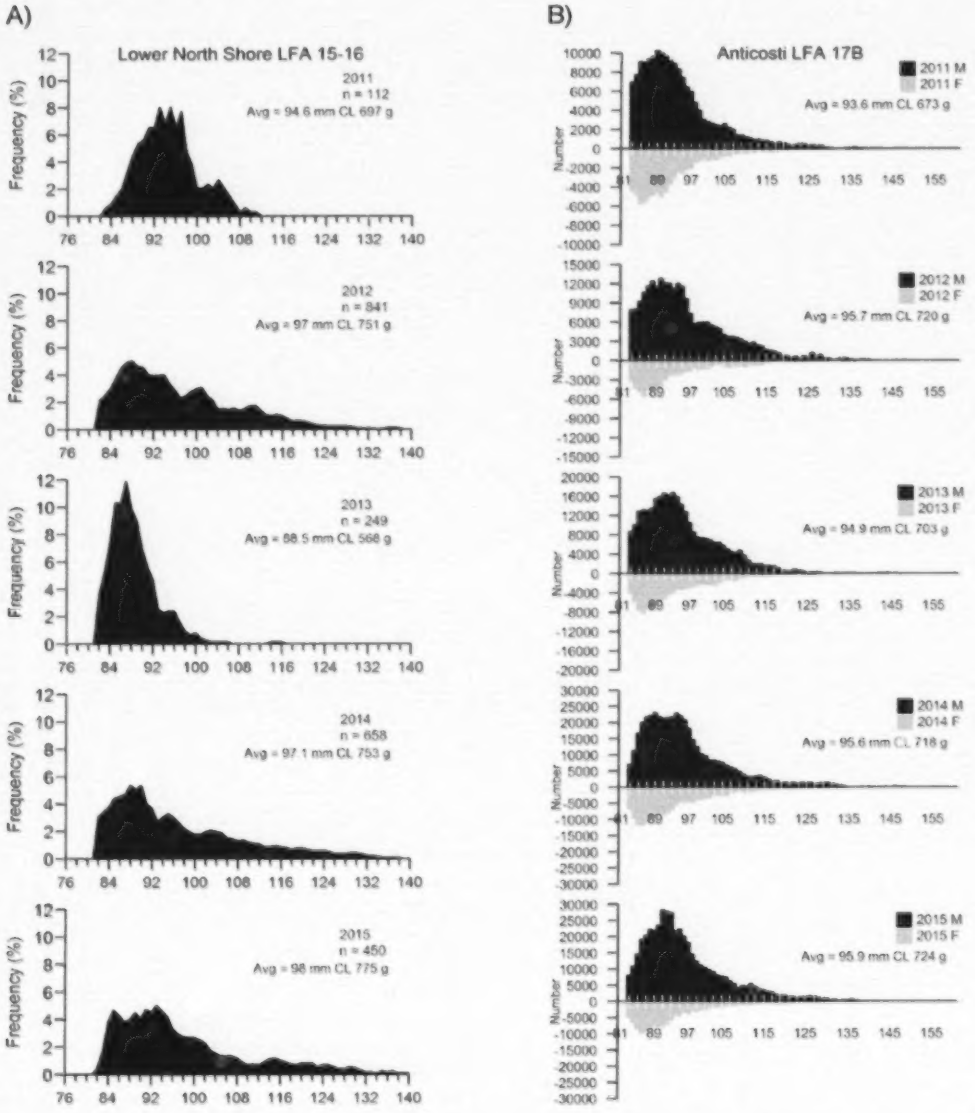


Figure 6. Size frequency distribution for commercial lobster A) on the Lower North Shore (LFAs 15 and 16) and B) at Anticosti Island (LFA 17B) from 2011 to 2015. For A), frequencies are in percentage; for B), frequencies are in weighted numbers per landings for males (black) and females (grey). The average size (Avg.) and number of lobster measured are indicated.

Sources of Uncertainty

In general, there is little data on lobster populations on the North Shore and at Anticosti Island. The use of logbooks should improve the quality of data on lobster abundance and distribution. However, the sampling of catches is insufficient, especially in LFAs 15 and 16. There are no indicators of stock productivity in terms of egg production and recruitment for these stocks.

CONCLUSION AND RECOMMENDATIONS

Lobster abundance on the Lower North Shore (LFA 15–16) is clearly lower than at Anticosti Island (LFA 17). However, in these two regions, there is a significant increasing trend in abundance since 2011. Additional information from at-sea sampling would be required to better assess these stocks. Generally, lobster populations on the Lower North Shore and at Anticosti Island are characterized by slow growth as well as a late sexual maturity and at larger size (90 mm and over), making them more vulnerable to over-harvesting. It is recommended that the minimum legal size be increased to be closer to the size at sexual maturity in order to minimize the impacts of increased fishing pressure in Area 17B. It is also recommended that Area 17 catches landed in the Magdalen Islands be sampled so that all three regions, from which the fishermen who exploit this resource come from, may be included in indicators.

SOURCES OF INFORMATION

This Science Advisory Report is from the meeting of February 25 and 26, 2016, on the Assessment of the Lobster in the Quebec's Inshore Waters. Additional publications from this meeting will be posted as they become available on the Fisheries and Oceans Canada Science Advisory Schedule.

DFO. 2012. Stock status assessment of lobster on the North Shore (LFAs 15, 16 and 18) and at Anticosti Island (LFA 17), Quebec, in 2011. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/020.

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